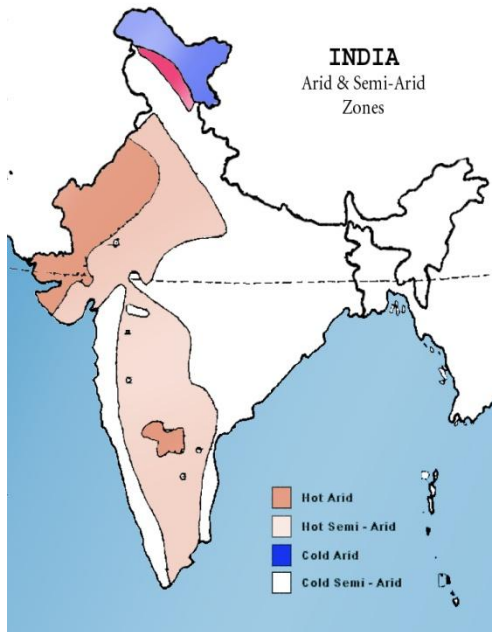




III The Semi-Arid Region

The northern arid regions in India comprise largely of the desert of Rajasthan, the Rann of Kutch and the semi-arid regions of Punjab and Gujarat. The Southern arid regions are in the rain shadow of the Western Ghats covering states of Maharashtra, Karnataka and Tamil Nadu.

In terms of being prone to drought however, the semi-arid region extends to a larger area. In fact 99 districts, most of them large in size, across 14 states are declared as drought prone districts. Over 75% of the cropped area (ie 131 million ha out of 174 million ha) is in the semi-arid tropics in the country.). Most of these drought prone districts are concentrated in Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka and Rajasthan, affecting 265 million people in the rural areas. Low and erratic rainfall coupled with extreme temperatures and intense solar radiation makes these regions the most vulnerable regions in India.



Water is scarce in these regions. The groundwater tables are low, rainfall is low and the water run-off is high. Annual rainfall is between 100 and 400 mm or 400 and 800 mm.

The northern arid regions are entirely dependent on groundwater and above-the-ground tanks, ponds, other traditional stores of water. No Hardy Options

rivers flow through these regions. The Southern peninsula, however, is fed by the peninsular rivers, which run through some of these regions, mainly fed through groundwater discharges and supplemented by monsoon rains.

The main source of water throughout the year for these regions is through small and medium stored water. Inland water resources i.e. tanks and lakes, beels, oxbow lakes, ponds etc. cover 7 M h.a. in the five states of Orissa, Andhra Pradesh, Gujarat, Karnataka and West Bengal. These water bodies are unevenly distributed. In many areas, the tank is the only water source. There are around 120,000 small-scale tanks, irrigating about 4.12 million ha., mostly in the semi-arid southern states of Andhra Pradesh, Karnataka and Tamil Nadu.

From the mainstream economics view, the low productivity of lands

Farmer's debt and suicide



in semi-arid regions and small land holdings have led to disguised unemployment, increasing the vulnerability of the region. True, under current agricultural practices, many dry-land farmers are unable to earn a year-round livelihood. For, the pastoralists or the goat/cattle keepers, water-scarcity, feed-scarcity, disease in animals, etc. are major problems. The reducing pasturelands and common grazing lands further put pressure on their livelihood.

Climate variability has been, and continues to be, the principal source of fluctuations in conventional food production, particularly in the semi-arid tropics. And a failure of one mono-cropped, high-yielding hybrid crop could destroy the farmer and push them into debt. This has been evident in the many farmer suicides in central India where recovery from crop failures has been impossible.

However, rural people in dry-lands have evolved suitable land-use and management systems of farming, pastoralism and animal husbandry and often rely on a combination of rain-fed agriculture, livestock rearing and other income generating activities to sustain themselves.

Bio-diversity & food security

Inter-cropped and traditional varieties have much more chances of surviving a bad and erratic monsoon and allow the farmer to be secure in basic food needs. Crop diversification and intercropping systems are a means to reduce the risk of crop failure due to adverse weather events, crop pest or insect attacks. But these systems are most suitable to small farm, labour-intensive subsistence farm economies. Studies have shown that households whose consumption levels are close to subsistence (and are therefore vulnerable to income shocks) devote a larger share of land to safer, traditional varieties of rice and castor than to riskier, high-yielding varieties and spatially diversify their plots to reduce the impact of weather shocks that vary by location. However such an economy which has been dis-incentivised by absurdly subsidized rice from irrigated large farm economies as opposed to say minor millets and other coarse grains.

The concern is, despite the mandatory noises favouring sustainable and rain-fed agriculture by the powers that be, the trends are that traditional seed banks of hardy crops, traditional manures and pest management tools are slowly disappearing and giving way to one-stop shops of agricultural inputs and finance promoting mono-cropping of cash crops like groundnut, sunflower, etc. The rules of seed subsidy and seed certification are such that decentralized traditional options are dis-incentivised.

Hardy Options

Diversification

While talking about a livelihood approach, development planners and NGOs tend to think of farmer remuneration or sustainable agriculture within the same economic paradigm as that of a factory or other unitary systems. They look for that one project which will give their clients a big income. However local rural people have plural strategies to cope with drought and climate variability.

According to Prof Sheshagiri Rao, farmer, researcher and agricultural scientist, working in Pavagadda, in the Karnataka part of Rayalseema region, the farmer in semi-arid regions spread their survival bets by taking to other activities like sheep and goat rearing. It is largely a form of gathering requiring little external investment. From the farmer's point of view, he invests only his labour. Because of the low cost involved it is highly profitable, and most of the surplus generated is directly consumed. Other similar activities are cattle rearing and poultry. Fishing is also an option where there are tanks and water bodies.

Another contributor to income in semi-arid regions, wage-labour and remittances from migrant labour, are trees. Despite their shortage, there are still trees (tamarind, mango etc) in revenue as well as gaothan lands in semi-arid regions like Rayalseema -- The tree owners are not very efficient in handling the produce. So many of the small farmers take these on annual lease and they get a big margin out of it. Others process non-timber forest produce, like brooms, boda grass, limestone etc. A fifth income earner is craft. Specialised tribes like Lambadas engage in handicraft. Others are involved in weaving, mat making and like.

Thus when we talk about a livelihood approach, it must certainly mean how the diverse organic linkages can be nurtured and maintained – rather than find one fixed project for each group, which end up making them victims of a larger uncertain market. However as the mainstream cash economy penetrates the countryside, the

traditional adaptation strategies are less able to insure the people against prolonged dry spells and erratic rains.

Impact of Climate Change on Semi-Arid Regions

It rained continuously for 8 days.. Everything is washed out.. We had grown onion, maize and now everything lies flat –

--Chandappaⁱ, small farmer in Bagalkot District, one of the flooded districts in north Karnataka in 2009 .

I used to draw water with help of oxen to water my fields, since 15 years we have very poor rainfall

-- a farmer in Anantapur districtⁱⁱ.

I lost my mango crop this year since it rained in February. --

Y.B.Ramakrishna, a bio-fuel entrepreneur and an organic farmer in central Karnatakaⁱⁱⁱ.

The Centre for Science & Environment quoting various studies^{iv} have summarized the complex ways in which global warming will impact agriculture in India. In certain crops geographical shift to cooler areas will occur. More carbon in the atmosphere might be useful for the crops but this effect will be nullified due to increase in temperatures. Changes in soil, increase in pest population and weeds are all inevitable with the increasing temperatures. Other likely impacts are change in farm ecology viz. bird-insect relations.

The lack of uniformity in temperature changes in India will affect microclimates and makes weather predictions more and more difficult. As the climate warms due to greenhouse gases, sea water evaporates faster and increases air moisture that condenses and falls as intense rains. The increased intense rainfall with less of moderate rainfall could decrease groundwater recharge and soil moisture, affecting agriculture.

Hardy Options

There have already been noticeable extreme climate events in recent years which took a heavy toll on crop output - the drought of 2002, the heat wave in Andhra Pradesh in May 2003, extremely cold winters in 2002 and 2003, and prolonged dry spell in July 2004 and January 2005 in the north, floods in the Rajasthan in 2005, drought in the north-east in 2006, abnormal temperature in January and February in 2007, and 23 per cent rainfall deficiency in the 2009 monsoon season. A trend of increasing monsoon seasonal rainfall has also been found along the west coast, northern Andhra Pradesh and northwestern India (+10% to +12% of the normal over the 100 years) while a trend of decreasing monsoon seasonal rainfall has been observed over eastern Madhya Pradesh, north-eastern India, and some parts of Gujarat and Kerala (-6% to -8% of the normal over the 100 years).

According to Mr. R.K.Pachauri, the possibility for drier conditions in arid and semi-arid regions is “very high”, leading to severe water shortages. He also emphasized the vulnerability of certain regions that will be doubly exposed to dangers of climate change and globalization. For e.g. Rajasthan would have a double impact of being drought prone with conditions being exacerbated by low irrigation coverage, low literacy levels and inadequate infrastructure. Karnataka will similarly face water scarcity, with the vulnerability being exacerbated by contract farming and cash cropping for exports. In Andhra, which is already semi-arid, the response of the groundnut farmers to import competition will leave them highly vulnerable to vagaries of Climate Change.

Pastoral groups that manage significant proportions of national livestock herds are particularly vulnerable to climate change. The number, distribution and productivity of permanent pastures and water points, which are so critical for livestock survival during the dry season, are bound to decline. Scarcer resources, coupled with current levels of demographic growth, are likely to lead to stronger competition and conflict between pastoral communities and between other groups.

The erratic climate events have also affected hitherto robust activities like horticulture; for example Vishnu Pandey reported that premature blooming of mango flowers due to above normal temperatures in the Malihabad area near Lucknow. The flowers are exposed to higher risk of shedding^v.

Policy concerns

India's policy on Agriculture in the context of climate Change, is foregrounded by the need to produce enough grain to meet the food requirements of the country. Speaking at meeting seeking to promote sustainable agriculture, Mr. Shyam Saran, the then chief negotiator for India at the COPs said, "As far as shifting our approach to sustainable agriculture is concerned, we have to keep in mind the quantity of food that the burgeoning population of this country needs. We have witnessed the Green Revolution helping the country achieve self-sufficiency in food grain production."

Mr. Saran thus seemed to predicate sustainability on "getting the best deal for the Indian farmers" as the means of meeting the galloping demand for food. The food grain production that he is talking about is overwhelming rice and wheat, precisely the ones most vulnerable to climate change, as they are being mono-cropped, using green revolution technology.

By foregrounding policy on aggregate food production, any talk of shifting to more ecological farming is being wrongly framed in economic paradigm which require centralized or aggregating procurement and distribution, an exercise which in itself is responsible for higher carbon emissions. Kapil Shah, Jatan Trust Gujarat^{vi} says that small farms are now being expected to be market driven which loosely translates to raising monocultures that subsequently erode the natural resource base. Government policies like high subsidies to costly and unnecessary inputs like fertilizers, genetically modified crops, exotic seeds, etc. The price support mechanism also encourages planting of monocultures of

a select few crops. Besides, the push to diversify away from food crops to cash crops for exports is impacting the cropping pattern.

Very little has been done to find alternatives to emission-heavy practices. The consumption and production of fertilizers in India is increasing by leaps and bounds: in 2006/07, consumption reached 21 mt of nutrients, a 9-fold increase since 1970, while the subsidy bill is estimated at Rs. 1,197 billion this year, a 3-fold increase over the previous year on account of the global commodity price spike.

This subsidy as well as indulgence in chemical farming is justified on saying that we need to feed the population. Responding as chairman to session on “GHG emission in an intensive agriculture scenario” at the National Workshop on Climate Change & Agriculture organised by Centre for Sustainable Agriculture, Mr. Shyam Saran said that the test will be whether the model that is being proposed and discussed at this workshop can deliver equally well. Responding to this, Ms Neth Dano of the Third World Network said a comprehensive review of 293 studies worldwide, published by the Journal of Renewable Agriculture and Food Systems in 2008 clearly proved that organic farming in the major crops out-yields conventional agriculture by a factor of 1.3.

The National Mission for Sustainable Agriculture speaks of attaining “ecologically Sustainable Agricultural Growth through progressive Adaptation and Mitigation. While the noises are sound, the mission still emphasizes the role of bio-technology. The Policy concern is that Growth is linked to extracting a monetary value out of the system, whereas the principle of sustainable practices, means that the outputs, inputs into the system, which is the principle of ecological farming. Whereas bio-technology options tends to be patented means of extracting rents out of discovery. Dr. Vandana Shiva of Navadanya in her opening address at the Attac Post Growth Society Congress in Berlin in May 2011, asserted that the technology which kills the ability of the seeds to reproduce itself, can never be sustainable or climate friendly. Dr. Shiva feels that the mission on sustainable agriculture under the National Action Plan on Climate Change is

based on the false assumption that genetic engineering will “create” climate resilience. Genetic engineering will not create drought resistant or flood resistance. Genetic modification is the latest form of bio-piracy, which will rob vulnerable communities of their adaptation capacity to climate change ^{vii}

ⁱ from the film “*I am drum that shall be heard*” by CED.

ⁱⁱ from the film “*Where is the monsoon*” by Deepa Dhanraj, a ILEIA film

ⁱⁱⁱ at one of the roundtable on Climate change, held by INECC in 2008.

^{iv} Rain Shocked, Archita Bhatta, Down To Earth, Mar 15, 2009.

^v Business Standard, 16 March 2009.

^{vi} National workshop on Climate Change & Sustainable Agriculture. November 2008, New Delhi by Dr. G V Ramanjaneyula, Centre for Sustainable Agriculture

^{vii} <http://ipsnews.net/news.asp?idnews=47505>